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from the Field to the Field

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1. Getting contractors to install the audible indication portion of the fire detection system in compliance with the contract and appropriate codes has been a continuing and ongoing problem. It has not been unusual for the systems to have sound level coverage with the following shortcomings:

- a. Notification devices cannot be heard in conference rooms or offices with closed doors.
- b. Notification devices cannot be heard above the noise of air handling equipment and exhaust fans.
- c. Notification devices cannot be heard in bathrooms, shower rooms, or locker rooms.

2. I thought it would be helpful to share these repetitive points of contention between the government and contractors. Part of the reason that these problems arise is that the contract documents do not frequently consider the actual sound level output required for each notification device in order to satisfy the NFPA 72 requirements. This lack of definite information causes problems in the field. This is because a specific number of devices are usually shown on the plans, and the contractor treats the notification system as a completed design, when in fact it needs to be treated as a performance requirement to obtain proper system operation. Showing the sound level output for each notification device would be a way of reducing this problem, but it does not solve all the problems.

3. The fire notification portion of the specifications is in Section 16721, Fire Detection and Alarm, paragraphs 2.6 through 2.6.3, and it only gives *specific* requirements on the performance of individual audible indication devices. The *system* performance requirements of audible indication devices are contained in NFPA 72 the National Fire Alarm Code, which is part of Section 16721 by reference. The basic requirements are:

- a. Each audible device is normally required to produce a minimum sound level of 85 dBA, measured 3.1 meters (10 feet) from the device. [ref. guide spec 16721, para. 2.6 through 2.6.3]
- b. Each audible device cannot exceed 120 dBA, measured at the minimum hearing distance from the device. [ref. NFPA 72, para. 6-3.2.1]
- c. The sound level must be at least 15 dBA above average ambient sound levels or 5 dBA above the maximum sound level that lasts at least 60 seconds, measured **1.5** meters (5 feet) off the floor. [ref. NFPA 72, para. 6-3.2.2]
- d. Where audible devices are installed in mechanical equipment rooms the minimum ambient sound level that shall be used for design guidance is at least 85 dBA. [ref. NFPA 72, para. 6-3.1.5]
- e. The required test method is to measure and record the sound pressure level with a sound meter meeting ANSI S-1.4a, Type 2, throughout the protected area. [ref. NFPA 72, Table 7-2.2 device 14.a]
- f. An average sound level greater than 105 dBA shall require the use of a visible signal appliance(s) in accordance with NFPA 72 Section 6-4. [ref. para. 6-3.1.2]
- g. The total sound level produced by the ambient sound and the notification devices shall not exceed 120 dBA anywhere in the occupied area. [ref. NFPA 72, para. 6-3.1.3]

(This list of requirements is not all inclusive and is only intended to cover the basic requirements. For specific special applications or types of systems, Chapter 6 of NFPA 72, is the best location to look.)

4. My office has developed some methods to try to make the process less painful and prolonged for both the contractor and the government. First, we make the contractor aware that there have been problems with the performance of fire alarm systems, we describe what the requirements are, and we explain that we expect the system to properly perform. This is done as early as possible in the contract during the response to the first fire detection system submittal. If it is a complicated system, we inform the contractor verbally and in an initial letter that addresses common repetitive problems. Notification to the contractor of what the requirements are usually leads to questions about how to meet these requirements when he does not know the ambient or maximum sound levels of the building. NFPA 72 provides a list of typical average ambient sound levels, and the contractor can obtain the expected sound levels of equipment he is providing from the manufacturers. The designers and users can also have information about anticipated maximum and ambient sound levels.

5. Next, careful review of the shop drawings, test procedures, and preparatory meetings are important. For a fire system, it is not unusual for us to hold multiple preparatory meetings. This started when we discovered that it is common to have three or four groups of people or subcontractors working on different parts of the fire detection system. For instance, it is not unusual to have one crew do the rough-in, one crew install the devices, and one crew do the testing. Even with one crew doing all the work, we have found fire system installation spans the length of the contract. Multiple preparatory meetings keeps the information fresh and we can cover the information when it is most useful.

6. Testing is the final step and sometimes the hardest one to get through. If the occupants cannot clearly hear the notification devices, they may not be aware that there is a fire until it is too late. Therefore, it is important to test the system in as near occupied conditions as possible. Contractors have asked to only test rooms that have devices in them, with the building not complete, or turn off equipment in the room that will normally be running. I make sure every possible occupied location gets tested and it is tested with the HVAC system running, equipment running (for example pumps, compressors, transformers, etc.), the PA systems in use, doors of rooms closed, and people talking. The bottom line, the performance of the system during a fire is what counts.

7. Fire detection notification systems have been an ongoing problem because contractors want to install the lowest sound producing device possible. Many times the lowest sound producing device will not provide the needed effect. I hope this review of common problems I have encountered and how my office deals with them will help.

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